

THE CLAIMS

1. A structured paper release liner for use with an article backed with a pressure sensitive adhesive, said liner comprising:

a piece of paper having a release side free of a structural support layer of a polymeric material, a back side, and a structured release surface having a pattern formed into said paper on said release side; and

a release material bonded to said structured release surface of said paper,
wherein the pattern formed in said paper is dimensioned so as to form fluid egress channels in a bonding surface of the pressure sensitive adhesive, when the pressure sensitive adhesive is applied to said structured release surface or said structured release surface is forced into the bonding surface of the pressure sensitive adhesive, such that the fluid egress channels define a structured bonding surface having exit pathways for at least some of the fluid to bleed out from behind the article when the article is adhered to a substrate.

2. The release liner according to claim 1, wherein said pattern comprises a plurality of outwardly extending protrusions that are sized and shaped so as to penetrate and form fluid egress channels in the pressure sensitive adhesive that is applied onto said structured release surface.

3. The release liner according to claim 1, wherein the pattern formed in said paper on said release side is a contiguous square pyramidal pattern with a shallow angle α of up to about 45 degrees.

4. The release liner according to claim 1, wherein said paper further comprises a support material on said back side of said paper.

5. The release liner according to claim 1, wherein said release liner does not include a support material on said back side of said paper.

6. The release liner according to any one of claims 1, 4 and 5, wherein said back side of said paper is relatively flat.

7. The release liner according to claim 1, wherein the pattern formed in said paper is operatively adapted, when the pressure sensitive adhesive is applied onto said structured release surface, so as to form such fluid egress channels that define a volume of at least $1 \times 10^3 \mu\text{m}^3$ per every 500 μm diameter circular area of the structured bonding surface of the pressure sensitive adhesive.

8. The release liner according to claim 1 or 7, wherein the pattern formed in said paper is operatively adapted, when the pressure sensitive adhesive is applied onto said structured release surface, so as to form such fluid egress channels that will be substantially undetectable on an upper surface of the article, after final application of the article onto a substrate, when the article is an adhesive-backed compliant film.

9. The release liner according to claim 1, wherein said paper is a clay-coated paper.

10. The release liner according to claim 1, wherein said release material is a UV curable silicone release material.

11. The release liner according to any one of claims 1 to 10, wherein said structured release surface is a microstructured release surface.

12. The release liner according to any one of claims 1 to 10, wherein the pattern formed in said paper is dimensioned so as to form fluid egress channels in the bonding surface of the pressure sensitive adhesive, when the pressure sensitive adhesive is applied to said structured release surface.

13. The release liner according to any one of claims 1 to 10, wherein the pattern formed in said paper is dimensioned so as to form fluid egress channels in the bonding surface of the pressure sensitive adhesive, when said structured release surface is forced into the bonding surface of the pressure sensitive adhesive.

14. The release liner according to any one of claims 1 to 13 in combination with a pressure sensitive adhesive so as to form an assembly, wherein fluid egress channels are formed in a bonding surface of the pressure sensitive adhesive, by the pattern formed in said paper, that define exit pathways for fluid to bleed out from behind said article when said structured bonding surface is disposed on a substrate

15. The release liner according to any one of claims 1 to 13 in combination with an article backed with a pressure sensitive adhesive so as to form an adhesive-backed article assembly, wherein fluid egress channels are formed in a bonding surface of the pressure sensitive adhesive, by the pattern formed in said paper, that define exit pathways for fluid to bleed out from behind said article when said structured bonding surface is disposed on a substrate.

16. The assembly according to claim 14 or 15, wherein said pattern provides a plurality of outwardly extending protrusions that penetrate and form said fluid egress channels in the structured bonding surface of said adhesive.

17. The assembly according to claim 14 or 15, wherein said fluid egress channels define a volume of at least $1 \times 10^3 \mu\text{m}^3$ per every 500- μm -diameter-circular-area-of-the-structured-bonding surface of said adhesive.

18. The assembly according to claim 15, wherein said article is a compliant film having an upper surface, and said fluid egress channels are configured by the pattern of said paper so as to be substantially undetectable on the upper surface of said film, after final application of said film onto a substrate.

19. The assembly according to claim 18, wherein said compliant film has a thickness in a range from about 25 μm to about 100 μm .

20. The assembly according to any one of claims 15, 18 and 19, wherein said adhesive-backed article is sealable as indicated by an initial percent wet out test result of at least 85%

21. A method of making an assembly, said method comprising:
providing a structured paper release liner according to any one of claims 1-13;
providing a pressure sensitive adhesive;
bringing together the pressure sensitive adhesive and the structured release surface of the paper release liner so as to form fluid egress channels in a bonding surface of the pressure sensitive adhesive;
wherein the fluid egress channels at least partially define a structured bonding surface of the adhesive having exit pathways for fluid to bleed out from behind the back of an article to which the adhesive is bonded, when the adhesive is used to bond the article onto a substrate.

22. The method according to claim 21, further comprising curing the pressure sensitive adhesive after said bringing together.

23. The method according to claim 21, wherein the pressure sensitive adhesive is a hot melt type PSA and during said method, the paper is heated to a temperature that would cause the release liner to become difficult to use in said method, if the pattern was formed in a structural support layer of thermoplastic resin material on the release side.

24. The method according to claim 21, wherein during said method, the paper is heated to a temperature that would cause the release liner to become difficult to use in said method, if the pattern was formed in a structural support layer of thermoplastic resin material on the release side.

25. The method according to any one of claims 21 to 24, further comprising:
bonding together the pressure sensitive adhesive and the back of an article to form an adhesive-backed article.
26. The method according to claim 25, further comprising:
forming the adhesive-backed article assembly by either performing said bonding together and then said bringing together or performing said bringing together and then said bonding together,
wherein the fluid egress channels at least partially define a structured bonding surface of the adhesive having exit pathways for fluid to bleed out from behind the article, when the structured bonding surface is disposed on a substrate.
27. The method according to any one of claims 21, 23 and 24, further comprising:
bonding together the pressure sensitive adhesive and the back of an article to form an adhesive-backed article;
forming the adhesive-backed article assembly by either performing said bonding together and then said bringing together or performing said bringing together and then said bonding together; and
curing the pressure sensitive adhesive after said forming of the adhesive-backed article assembly.

28. A method of making a structured paper release liner, for use with an article backed with a pressure sensitive adhesive, said method comprising:

providing a piece of paper having a release side free of a structural support layer of a polymeric material and a back side;

forming a pattern in the paper on the release side so as to produce a structured release surface on the release side, the pattern formed in the paper being operatively adapted so as to form fluid egress channels in a bonding surface of the pressure sensitive adhesive, when the pattern and the bonding surface are brought together, such that the fluid egress channels define a structured bonding surface having exit pathways for fluid to bleed out from behind the article when the article is adhered to a substrate; and

providing a release material on the release side of the paper, either before or after forming of the structured release surface.

29. The method according to claim 28, wherein said forming occurs without imparting a substantial portion of the pattern through to the back side of the paper.

30. The method according to claim 28 or 29, wherein the release liner further comprises a support material on the back side of the paper.

31. The method according to claim 28 or 29, wherein the release liner does not include a support material on the back side of the paper.

32. The method according to any one of claims 28 to 31, wherein the structured release surface is a microstructured release surface.